CLAIMS

1) A method for predictive maintenance of an operating component (3; 11) of an automatic machine; the method acquiring a first and a second measurement relative to a first and, respectively, a second characteristic quantity of the operating component (3; 11), obtaining a first and a second value (V) which are functions of the first and, respectively, second measurement, and to compare the first and second value (V) with given reference data; the method being characterized by determining a specific defect of the operating component (3; 11) as a function of a combination of a comparison between the first value (V) and the given reference data with a comparison between the second value (V) and the given reference data, and/or as a function of a comparison between the given reference data and a combination of said first and second value (V); and programming maintenance to correct said defect, as a function of the combination of the comparison between the first value (V) and the given reference data with the comparison between the second value (V) and the given reference data, and/or as a function of the comparison between the given reference data and the combination of said first and second value (V).

2) A method as claimed in Claim 1, wherein the given reference data comprises a first and a second threshold value; said first value (V) being compared with the first threshold value, and the second value (V) being compared with the second threshold value; and the specific defect of the operating component being determined as a function of the difference between the first value (V) and the first threshold value, and of the difference between the second value (V) and the second threshold value.

3) A method as claimed in Claim 1 or 2, wherein the given reference data comprises a third threshold value; the combination of the first and second value (V) being compared with the third threshold value; and the specific defect of the operating component being determined as a function of the difference between the third threshold value and the combination of the first and second value (V).

4) A method as claimed in one of the foregoing Claims, wherein the first value (V) is a function of the time pattern of the first measurement; the second value (V) being a function of the time pattern of the second measurement.

5) A method as claimed in one of the foregoing Claims, wherein a first experimental curve, which extrapolates the time pattern of the first value (V), is determined, and a second experimental curve, which

extrapolates the time pattern of the second value (V), is determined; the given reference data comprising a first and a second reference curve, which are functions of time; and the method programming maintenance as a function of the instant in which the first and/or second experimental curve intercept the first and second reference curve respectively.

6) A method as claimed in Claim 5, wherein the first and second experimental curve are linear curves.

7) A method as claimed in Claim 5 or 6, wherein the first and second reference curve each define a respective constant reference value.

8) A method as claimed in one of the foregoing Claims, wherein a third experimental curve, which extrapolates the time pattern of the combination of the first and second value, is determined; the given reference data comprising a third reference curve which is a function of time; and the method programming maintenance as a function of the instant in which the third experimental curve intercepts the third reference curve.

9) A method as claimed in Claim 8, wherein the third experimental curve is a linear curve.

10) A method as claimed in Claim 8 or 9, wherein the third reference curve defines a constant reference value.

11) A method as claimed in one of the foregoing

Claims, wherein the operating component (3; 11) comprises a bearing (11); the first and second characteristic quantity being characteristic quantities of the bearing (11), and being selected from the group consisting in:

- temperature (T) of the bearing (11);
- total vibrational energy (G);
- vibrational energy at 6-10 kHz frequencies (H);
- vibration kurtosis (K);
- vibrational energy at given frequencies (F) typical of damage to the bearing.

12) A method as claimed in Claim 11, wherein the bearing (11) comprises an outer ring (13) mounted coaxially with a rotary shaft (9); and a number of rotating elements (14), in particular, balls, located between the outer ring (13) and the rotary shaft (9); the given frequencies being selected from the group consisting in:

- frequencies (FE) typical of damage to the outer ring (13);
- frequencies (FR) typical of damage to a rotating element (14);
- frequencies (FI) typical of damage to the rotary shaft (9) at the bearing.

13) A method as claimed in Claim 11 or 12, wherein the bearing (11) is mounted coaxially with a rotary shaft (9); vibrational energy being determined by two

sensors (16) oriented radially with respect to the rotary shaft (9) and at a 90° angle with respect to each other.

14) A method as claimed in one of Claims 11 to 13, wherein measurements are acquired of at least each of the following quantities: temperature (T) of the bearing (11), total vibrational energy (G), vibrational energy at 6-10 kHz frequencies (H), vibration kurtosis (K), and vibrational energy at given frequencies (F); the method obtaining a respective value (V) as a function of each measurement.

15) A method as claimed in Claim 14, wherein each value (V) is compared with a respective threshold value.

16) A method as claimed in Claim 15, wherein a defect (L), caused by poor lubrication, is determined when the values (V) relative to the temperature (T) of the bearing (11), to total vibrational energy (G), to vibrational energy at 6-10 kHz frequencies (H), and to vibrational kurtosis (K) exceed the respective threshold values, and when the value relative to vibrational energy at given frequencies (F) is below the respective threshold value.

17) A method as claimed in Claim 15 or 16, wherein the bearing (11) is fitted to a support (10); a defect (LF), caused by a loose connection between the bearing (11) and support (10), being determined when the values (V) relative to total vibrational energy (G), to

vibrational energy at 6-10 kHz frequencies (H), and to vibrational kurtosis (K) exceed the respective threshold values, and when the values (V) relative to vibration energy at given frequencies (F), and to the temperature (T) of the bearing (11) are below the respective threshold values.

18) A method as claimed in one of Claims 11 to 17, wherein a defect (D), caused by damage to the bearing (11), is determined when the values (V) relative to total vibrational energy (G), to vibrational energy at 6-10 kHz frequencies (H), to vibrational energy at given frequencies (F), and to vibration kurtosis (K) exceed the respective threshold values, and when the value relative to the temperature (T) of the bearing (11) is below the respective threshold value.

19) A method as claimed in one of Claims 1 to 10, wherein the operating component (3; 11) comprises a fan (3) integral with a shaft (9) rotating on at least one radial bearing (11); the method acquiring measurements of at least two quantities selected from the group comprising:

- total vibrational energy (G);
- vibrational energy at 110-1000 Hz frequencies (IS);
- vibrational energy at the basic frequency (FF) of the machine;
- suction pressure (P) of the fan;
- temperature (T) of the bearing (11);

- vibrational energy at 6-10 kHz frequencies (H);
- vibration kurtosis (K);
- vibrational energy at given frequencies (F) typical of damage to the bearing;

the method obtaining a respective value (V) as a function of each measurement.

20) A method as claimed in Claim 19, wherein measurements are acquired relative to at least each of the following quantities:

- total vibrational energy (G);
- vibrational energy at 110-1000 Hz frequencies (IS);
- vibrational energy at the basic frequency (FF) of the machine;
- suction pressure (P) of the fan;
- temperature (T) of the bearing (11);
- vibrational energy at 6-10 kHz frequencies (H);
- vibration kurtosis (K);
- vibrational energy at given frequencies (F) typical of damage to the bearing;

the method obtaining a respective value (V) as a function of each measurement.

21) A method as claimed in Claim 19 or 20, wherein each value is compared with a respective threshold value.